Greenstar FS CDi
gas-fired condensing regular floor standing boiler series

Best Buy Which? Gas Boilers September 2012

WORCESTER Bosch Group

Worcester and you. Making a difference.

BOSCH
Invented for life

As part of the Bosch Group, Worcester products are designed and manufactured to provide customers with the highest levels of quality and reliability which are synonymous with the Bosch name throughout the world.

As part of Europe's largest supplier of heating products, Worcester, Bosch Group has the UK-based resources and support capability to offer you the value-added solutions you deserve. Worcester employs a nationwide network of Service Engineers and technically trained Field Sales Managers supported by an experienced technical services team which is able to provide comprehensive support and advice from designing system layouts through to installation.

Worcester is dedicated to providing energy efficient gas- and oil-fired condensing boilers, as well as an extensive range of renewable technologies. All of our products have been developed and introduced with the aim of helping the UK to achieve the Government's efficiency targets.

The reception and main entrance at our Worcester headquarters

"At Worcester we recognise the vital role you play in the specification and installation of energy efficient appliances in homes across the UK. We will continue to invest in our products, people, facilities and added value services to ensure you have all you require in order to deliver only the best solutions to your customers' requirements."

Carl Arntzen,
Managing Director,
Bosch Thermotechnology Ltd.

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The Greenstar FS CDi Regular condensing boiler series

The Greenstar FS CDi Regular series is part of a market leading range of energy-saving condensing floor standing gas-fired boilers.

Higher efficiency therefore highly cost effective

All of the new Greenstar FS CDi Regular condensing boilers are SEDBUK A rated. This means they have an average annual efficiency of over 90%, standard efficiently boilers achieve around 78% efficiency. Therefore by upgrading to a Greenstar FS CDi Regular boiler, consumers can reduce their gas bills as well as their carbon footprint.

Greenstar FS CDi Regular condensing boilers deliver this energy-saving performance by recycling exhaust gases to extract the latent heat – a highly efficient use of energy which also significantly reduces carbon dioxide emissions into the atmosphere.

To all these major benefits you can add yet more: renowned Worcester quality and reliability; a range of outputs to satisfy the heating demands of a range of households and truly all-round value for money.

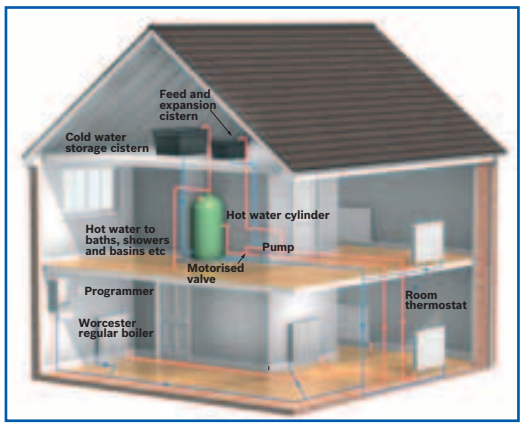
The Greenstar FS CDi Regular series at a glance

		FS 30CDi Regular	FS 42CDi Regular
Output kW to central heating (CH)	**Min**	7.7	9.6
	Max	30	40.8
Primary temperature control		✓	✓
Natural gas		✓	✓
LPG		✓	✓
Electronic ignition		✓	✓
2005 SEDBUK value – natural gas		90.5% / A rated	90.3% / A rated

Features	Benefits
SEDBUK Band A	High efficiency
Aluminium-silicon heat exchanger	Lightweight with rapid heat transfer
Robust heat exchanger	More tolerant to existing systems
Pre-fabricated pipe connections supplied	No pipe fabrication required
Multi-directional Condensfit II™ fluing – compatible with plume management	Siting flexibility
Flexible flue for chimney installation	Ideal for replacement market where existing boiler uses chimney
Fault finding diagnostics	Time saving
Operational status indicator	Consumer friendly
Anti-cycle control	Energy saving
Rigid 22mm gas connection	No pre-forming of gas supply
Built-in frost protection	Money saving, economical protection
Built-in condensate pump – 4.5m head	Increases siting possibilities
Roll-in boiler	Minimises risk of damaging floors

The Greenstar FS CDi Regular condensing boiler series

The Worcester Greenstar FS CDi Regular is a floor standing gas-fired condensing “heating only” or regular boiler. The appliance combines within one casing a cast-aluminium heat exchanger, fan, gas valve and other electronic and mechanical equipment necessary to provide full central heating.



Regular boiler layout

The Greenstar FS CDi Regular is a multi-directional room sealed fan assisted (RSF) appliance. The flue may be run horizontally and vertically with additional 90° and 45° bends.

The Greenstar FS CDi Regular design benefits in operation

Whenever a demand for DHW or CH is made, the boiler’s electronic control system is activated and the burner electronically ignited via a flame ionisation system.

The pre-mix burner automatically adjusts to the set level. The flow temperature of the boiler is then maintained at the customer setting by the fascia mounted variable control. Should the system requirements reduce during operation (TRVs closing down etc.), and the flow temperature exceed the customer setting then the burner will modulate downwards to match the system demand level. Should the flow temperature continue to rise then the burner will be de-energised and the control system will go into an anti-cycle mode and not allow the appliance to re-fire for a set period.

Fluing

The Greenstar FS CDi Regular series features 2 different sizes of multi-directional RSF flue systems, 100mm or 125mm dia.

The flue can be run horizontally or vertically with additional 90º or 45º in-line bends allowing changes of route or direction, providing an extremely flexible and versatile fluing system enabling the appliance to be sited virtually anywhere.

In addition an 80mm flexible flue system is available which utilises an existing chimney in the building to route the flue terminating on top of the chimney.

More details on our flexible flue system are shown on pages 24-25.

Versatility

Gas

The Greenstar FS CDi Regular is manufactured in both natural gas and Liquid Petroleum Gas (LPG) variants.

Greenstar FS CDi Regular boilers

Greenstar FS CDi Regular boilers are designed for connection to a fully pumped heating and hot water system i.e. S or Y plan. For this reason no plug-in controls are available on Greenstar FS CDi Regular models. The advice of a controls manufacturer should be sought.

Controls

The Worcester Greenstar FS CDi Regular fascia incorporates a combined temperature control and burner reset button.

The fascia also displays 2 operational status neons indicating the following:

- Mains on/lockout
- Burner on.

The mains on/lockout indicator also operate as fault finding diagnostics flashing in different sequences in the unlikely event of a boiler fault.

The Building Regulations Section L 2006 require a minimum level of controls to be installed on all heating systems, both on new build and refurbishment.

This would require:

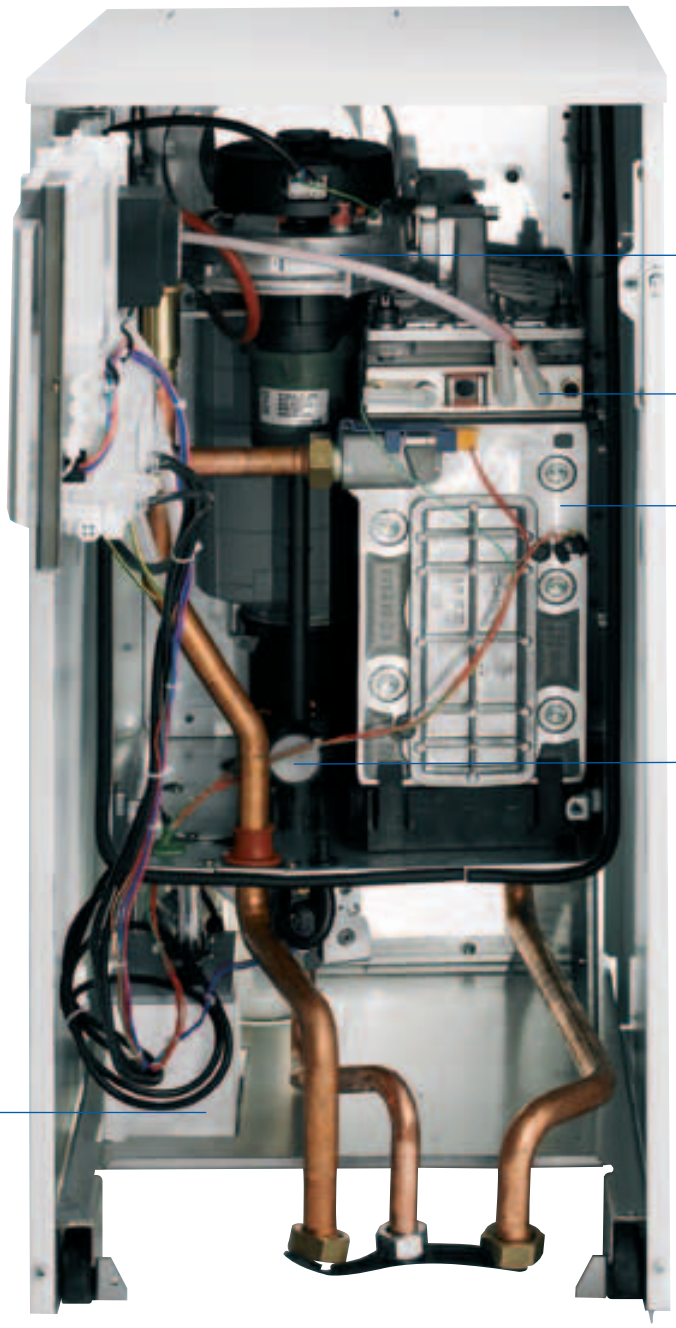
- Room thermostat
- TRVs on all radiators, or at least those radiators in sleeping areas if not already fitted. Do not fit TRVs in the room in which the room thermostat is installed
- Time and temperature control for central heating
- Automatic by-pass.*

Applications

- Greenstar FS CDi Regular boilers are suitable for a wide range of heating loads allowing extension to the heating system without upgrading the boiler
- The Greenstar FS CDi Regular is capable of operating on both open vent and sealed primary water systems
- Two or more Greenstar FS CDi Regular boilers can be linked together to cater for commercial or industrial applications
- Using the new flexible flue system the Greenstar FS CDi is an ideal replacement for a floor standing boiler located near a fireplace and using a chimney liner to flue.

**Where requested – see installation booklet for further details.*

Inside story – the Greenstar FS CDi Regular condensing boiler



Technical data

Model		FS 30CDi Regular	FS 42CDi Regular
Height (mm)		850	850
Width (mm)		400	400
Depth (mm)		600	600
Weight – dry (kg)		55.1	55.1
2005 SEDBUK value – natural gas		90.5% / A rated	90.3% / A rated
2005 SEDBUK value – LPG		91.9% / A rated	91.1% / A rated
2009 SEDBUK value – natural gas		88.9%	88.8%
2009 SEDBUK value – LPG		89.9%	89.8%
Heating flow / return connections		28mm compression	28mm compression
Gas connection		22mm compression	22mm compression
Max. flow temperature (ºC)		88	88
Output to central heating	kW	7.7 - 30	9.6 - 40.8
	(Btu)	(26,272 - 102,360)	(32,755 - 139,210)
Max. vertical flue (mm) (100mm dia.) inc. terminal		6,400	6,400
Max. vertical flue (mm) (125mm dia.) inc. terminal		15,000	15,000
Max. horizontal flue (mm) (100mm dia.)		4,000	4,000
Max. horizontal flue (mm) (125mm dia.)		13,000	13,000
NOx classification		Class 5	Class 5
Noise output level (dB(A))		37	37

Site preparations and guidance

Greenstar FS CDi Regular boilers are designed for connection to a traditional heating and hot water system. The major benefits of the Greenstar FS CDi Regular boiler are:

- The boiler is compatible with S and Y plan systems
- The boiler comes with a roll-in boiler tray and pre-plumbing jig.

Greenstar FS CDi Regular boilers are exceptional for their number of additional time-saving installation features:

- Built-in frost sensor for boiler protection
- Built-in fault finding diagnostics
- Automatic gas pressure adjustment
- Highly versatile multi-directional fluing system
- Combined ignition and control board means fewer connections
- A rigid 22mm compression gas connection eliminating the need for pre-fabricating the gas pipe onto the isolating valve
- The large output range capability of the appliances.

Siting of appliance

General

The appliance is not suitable for external installation.

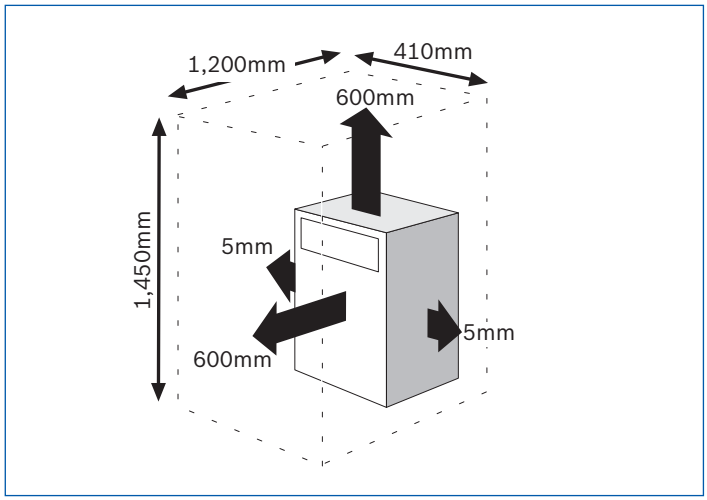
The appliance may be installed in an airing cupboard if required. See section “Compartment Installation” on page 11.

Clearances

The following clearances should be allowed for installation and servicing.

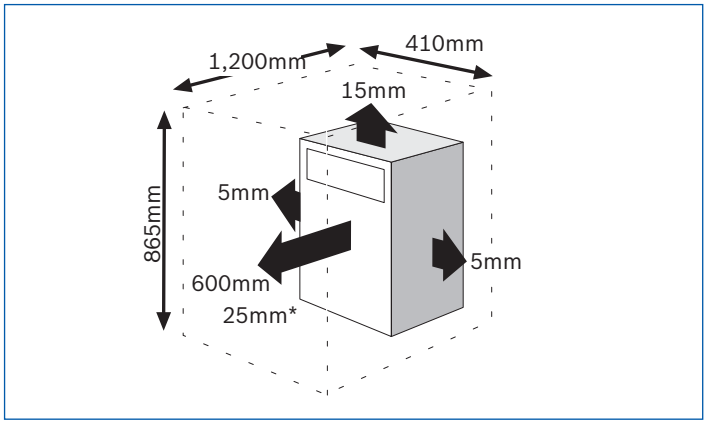
Installation clearances

The minimum space required to install the boiler only.



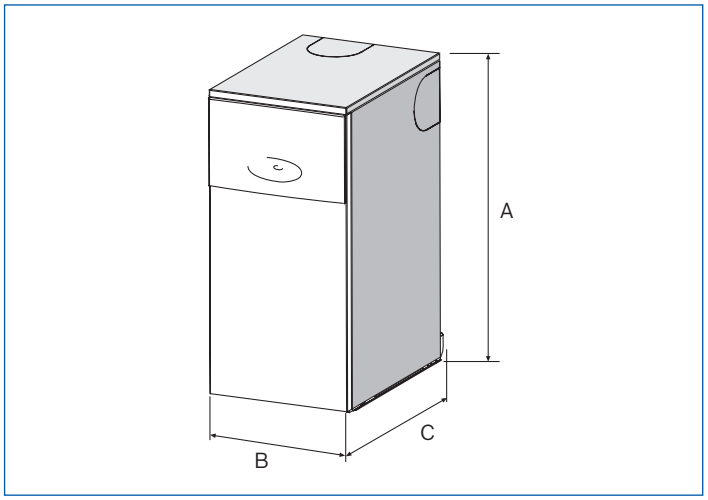
Service clearances

The minimum space required to service the boiler only.

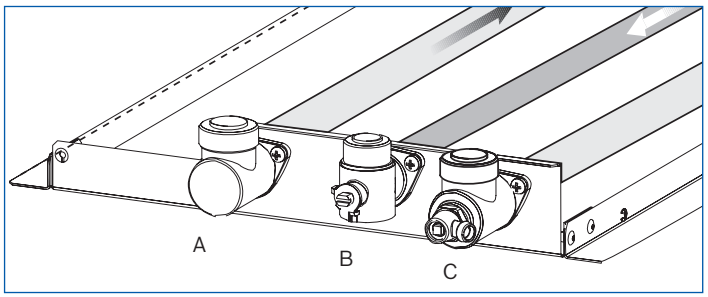


**25mm to a removable door*

Pipework connections and casing dimensions



Cabinet dimensions (mm)	
A	850
B	400
C	600



Pipework connections		
A	CH flow	22mm
B	Gas inlet	22mm
C	CH return	22mm

Compartment installation

The appliance may be installed in any room, although particular attention is drawn to the requirements of the IEE regulations applicable and in Scotland the electrical provisions with respect to installation in a room containing a bath or shower.

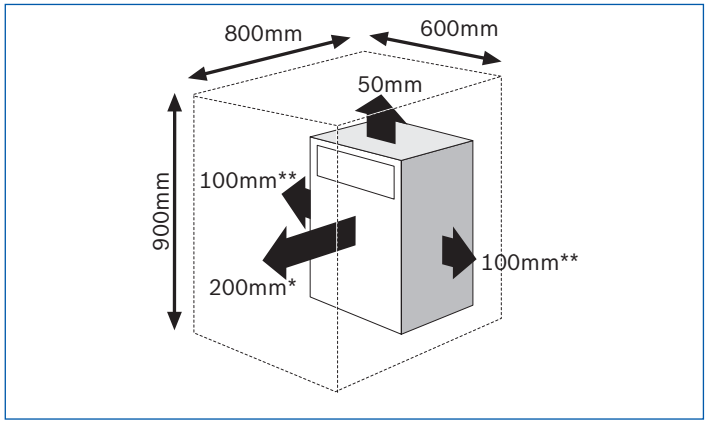
Air supply

1. The room in which the appliance is installed does not require a dedicated air vent.

2. If the appliance is installed in a cupboard or compartment with dimensions that allow the following minimum clearances, then no ventilation is required:

Compartment installation	
Position of appliance	**Min. unventilated clearance (to removable door)**
In front	200mm
Right side	100mm*
Left side	100mm*
Above	50mm

**This space can be reduced to 50mm for one side only as long as both the side clearances add up to the total of both of the side measurements shown or more.*



**Space required for unvented areas with a removable door or panel.*
***This space can be reduced to 50mm for one side only as along as both the side clearances add up to the total of both the side measurements shown or more.*

Boiler location & clearances

Bathrooms

IMPORTANT:
Any switch or appliance control using mains electricity must not be within reach of a person using the bath or shower.

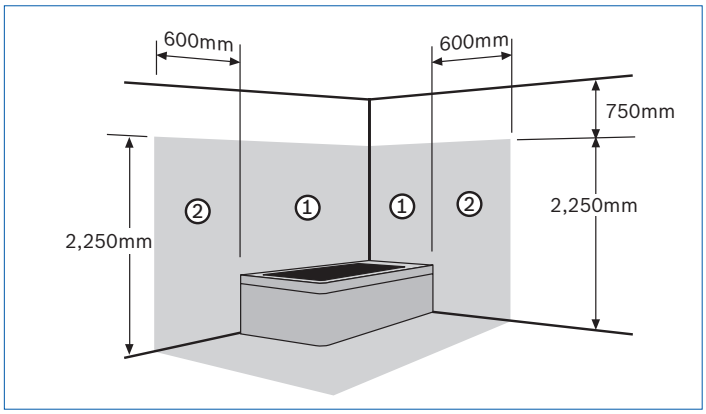
Electrical switches, fused spurs and socket outlets must not be situated in the bathroom.

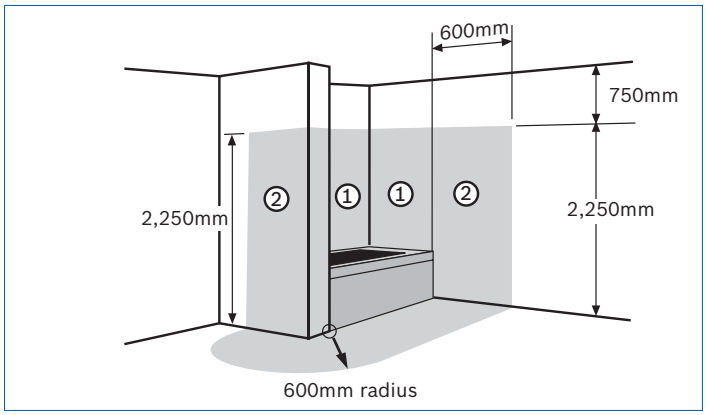
A boiler fitted with a non-mechanical timer or with no timer can be installed in zone 2 or outside the shaded area.

A boiler with a mechanical timer or RF mechanical timer with a room thermostat must only installed outside the shaded area.

Additional Residual Current Device (RCD) protection may be required.

Refer to the latest IEE wiring regulations.





Condensate pipework

All condensing boilers generate condensate discharge which needs to be piped away from the appliance using a plastic pipe.

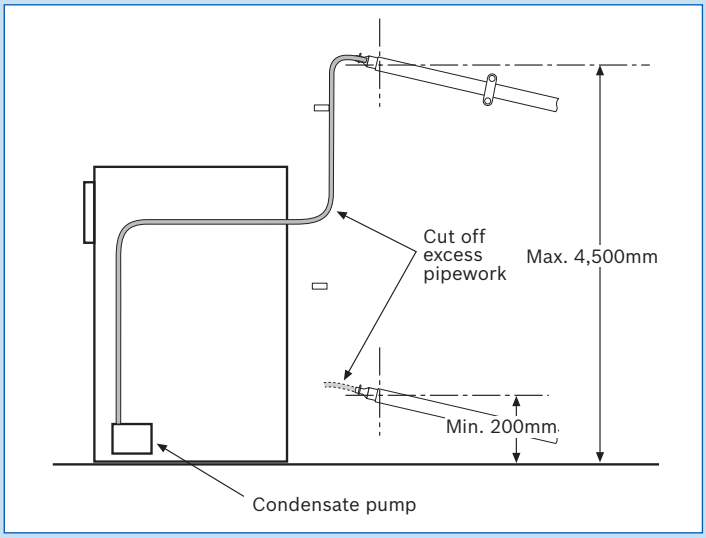
The amount of condensate generated depends on the efficiency and operating status of the appliance. Depending on operating temperatures, the appliance will condense in both heating and hot water modes and may generate up to 2.7 litres of condensate per hour for the FS 30CDi Regular and 3.7 litres per hour for the FS 42CDi Regular.

Condensate termination and route

Greenstar FS CDi Regular boilers incorporate a condensate pump which allows condensate to be plumbed above the boiler, allowing more flexible siting possibilities.

Condensate connection

The condensate pump fills up and periodically discharges through the flexible condensate pipe between 200mm and 4,500mm from floor level. After this point the condensate continues down the 22mm rigid pipework to the outlet using gravity.



- The flexible plastic pipe can be reduced in length to suit the installation circumstances. The pipework must follow one of the options shown opposite.

Never terminate or discharge into any open source, including: sink, bath, shower, bidet, toilet etc.

Note: any external condensate pipework should be protected with weather resistant insulation to help prevent freezing.

The condensate connection on Worcester appliances is in 22mm polypropylene. The pipe should be extended and run away from the appliance with a constant fall of 3º or at least 50mm in every metre away from the boiler.

The condensate pipe can terminate into any one of four areas.

Whilst all of the methods are acceptable it is best practise to terminate the condensate pipe via an internal waste system. This will eliminate the need for any external condensate pipe runs which can be susceptible to freezing in extreme weather. Best practise is not to run external condensate pipe any further than 3m. If it is necessary to run more than 3m externally increase pipe size to 32mm.

Condensate termination and route

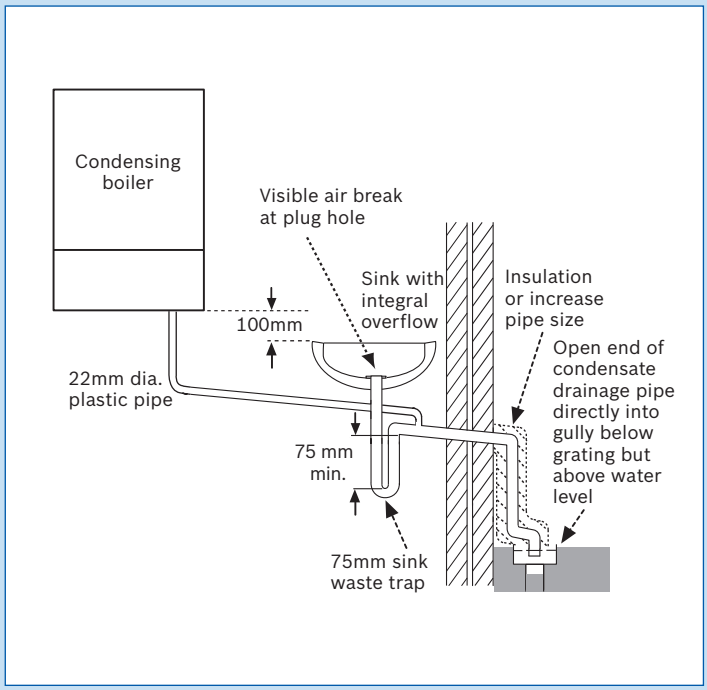
External condensate pipework

The Worcester Greenstar FS CDi Regular appliances have a condensate pump rather than a syphonic condensate trap. Rather than the condensate constantly dripping into the discharge pipe, the condensate is collected in the pump which releases it in 100ml quantities. This will help prevent freezing occurring.

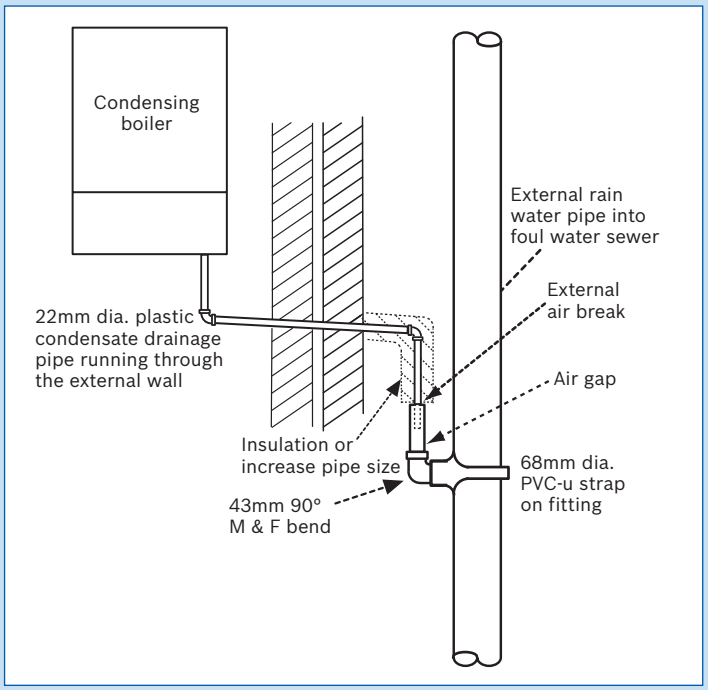
Wherever possible the condensate discharge pipework should be routed and terminated internally. Should this not be possible, and the only available route is external, the following conditions should be observed:

- The pipework length should be kept to a minimum and the route as vertical as possible
- Where pipework could be subjected to extreme cold or wind chill, a weather proof insulation should be used. **Alternatively, the condensate pipework could be increased to a minimum 32mm.**

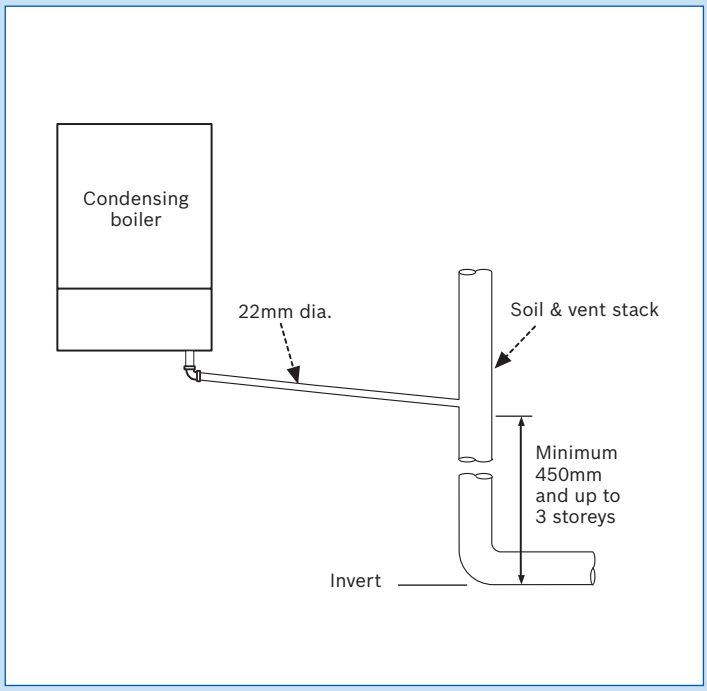
For full technical information on pipe size, insulation and different condensate pipework methods please see Installation, Commissioning and Servicing Instruction Manual.



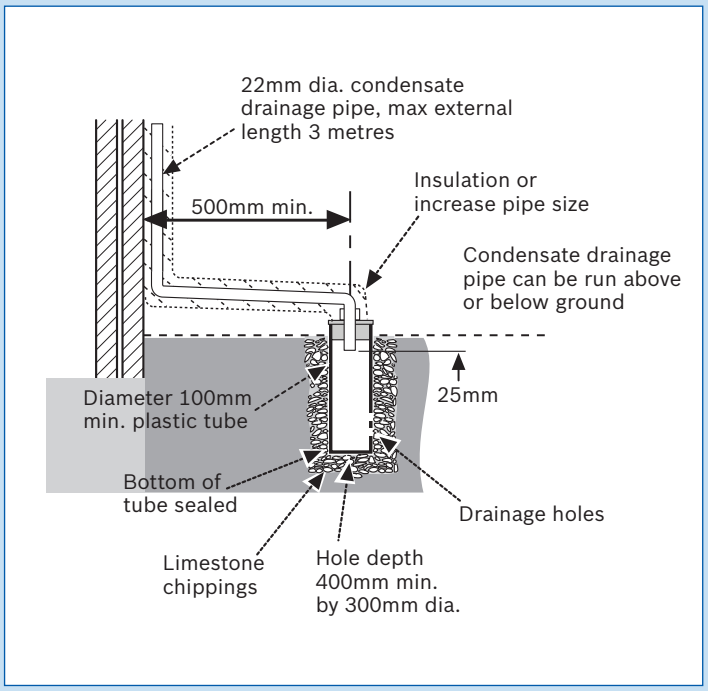
Internal sink/washing machine drain



External air break when using a foul water down pipe



Soil and vent stack



External condensate absorption point (unsuitable for clay soil types)

Installation requirements

Installation of the Greenstar FS CDi Regular Series must be in accordance with the relevant requirements of the Gas Safety (Installation Use) Regulations at the time of installation, current IEE Wiring Regulations, local Building Regulations, Building Standards (Scotland) regulations and bylaws of the local Water company and Health and Safety Document No. 635 (Electricity at Work Regulations 1989). It should be in accordance with the relevant recommendations of the following British Standards:

BS 6798; BS 5449; BS 5546:1; BS 5440:1; BS 5440:2; BS 6891.

Gas Safety (Installation and Use) Regulations. All gas appliances must be installed by a Gas Safe registered person in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution.

The manufacturer's notes must not be taken in any way as overriding statutory regulations.

Sealed primary systems

The appliance is fitted with a manual reset high limit thermostat and is suitable for use with a sealed primary system.

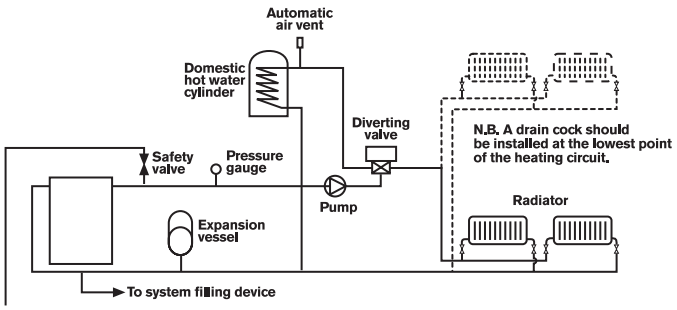
The system should be installed in compliance with the requirements of BS 5449: Part 1. The boiler must be fitted with a spring loaded safety valve set to operate at 3bar (45 psi) and the pipe connections made through the system must be capable of sustaining a pressure of up to 3bar.

Manual air vents should be fitted at any high points in the system.

The following is a list of major items which must be fitted to the system:

1. Safety valve – 3bar
2. Pressure gauge – 0 - 4bar
3. Expansion vessel
4. Automatic air vent

Typical fully pumped sealed system



The use of plastic pipework is acceptable. However, some plastics are permeable to oxygen and must be avoided. Only pipework with a polymeric barrier should be used. Please note that the first 600mm of pipework connected to the boiler must be of copper.

Open vented primary systems

Greenstar FS CDi Regular boilers are designed for connection to an open vented fully pumped heating and hot water system.

The following points are for guidance only. The system installation should be carried out in accordance with BS 5449:Part 1.

The feed and expansion pipes must rise continuously from the appliance and must be of the minimum diameter shown below.

The cistern must be arranged to provide a minimum static head of 0.25 metres above the top of the highest point in the heating circuit.

Air in the appliance is expelled through the vent pipe or dissipated into the system. Manual air vents should be fitted at any high points in the system.

Air supply

The Worcester Greenstar FS CDi Regular is a room sealed appliance; the room in which it is installed does not therefore require a purpose provided combustion air vent.

Natural gas supply

The appliances when on full output demand will require up to 3.27m³/h (FS 30CDi) or 4.4m³/h (FS 42CDi) of gas. The gas meter and supply pipes must be capable of supplying this quantity of gas in addition to the demand from any other appliance being served. Under no circumstances should the size of the gas supply pipe be less than that of the appliance inlet connection (22mm diameter). The meter outlet governor should be capable of ensuring a dynamic nominal pressure of 20mbar (8in wg) at the appliance. Particular consideration should be given to the resistance to gas flow created by elbows, bends etc. Pipework should be sized to overcome this resistance, and details of this are given in the following table.

	Total length of gas supply pipe (m)			Pipe diameter (mm)
	3	6	9	–
Gas discharge rate m³/h	2.9	–	–	15
	8.7	5.8	4.6	22
	18.0	12.0	9.4	28

Approximate additional length to be allowed (natural gas)

Elbows or tees	
Metres	Feet
0.5	2

90º bends	
Metres	Feet
0.3	1

Liquid Petroleum Gas (LPG) supply

The Greenstar FS CDi Regular appliance is available in an LPG version. The appliance, when on demand at full output will require 2.3kg/h for the FS 30CDi Regular and 3.3kg/h for the FS 42CDi Regular.

The gas tank or bottles must be capable of supplying this quantity of gas at a nominal pressure of 37mbar (14.8in wg) at the appliance. The table below shows the LPG discharge through varying lengths of pipe and the resistance to flow created by elbows, bends etc. Pipework should be sized to overcome this resistance.

	Total length of gas supply pipe (m)			Pipe diameter (mm)
	3	6	9	–
Gas discharge rate m³/h	1.5	1.01	–	15
	8.0	5.2	4.2	22
	15.9	8.9	8.3	28

Approximate additional length to be allowed (LPG)

Elbows or tees	
Metres	Feet
0.6	2

90º bends	
Metres	Feet
0.3	1

Electricity supply

A 3 amp fused three pin plug and unswitched shuttered socket outlet (both complying with BS 1363) or preferably a double pole isolator with a contact separation of 3mm in all poles supplying the appliance should be used.

The appliance electrical circuits are also protected by an internal 2.5 amp fuse. The appliance must be earthed.

Guarantee

Worcester Greenstar FS CDi Regular appliances are offered with a full 2 year guarantee* on parts and labour, a 10 year guarantee* on the primary heat exchanger and a 5 year guarantee* on the plate heat exchanger. Ongoing service and maintenance contracts can be arranged through the Worcester Customer Service Department.

Please contact our guarantee registration advisors on 0844 892 2552 or visit **www.worcester-bosch.co.uk/guarantee**

Subject to conditions.

The Worcester Greenstar System Filter

Modern condensing boilers are precision engineered and designed to run with a clean water heating system. Over time, dirty system water will damage a boiler and its components, causing failures and shortening the life of the overall system.

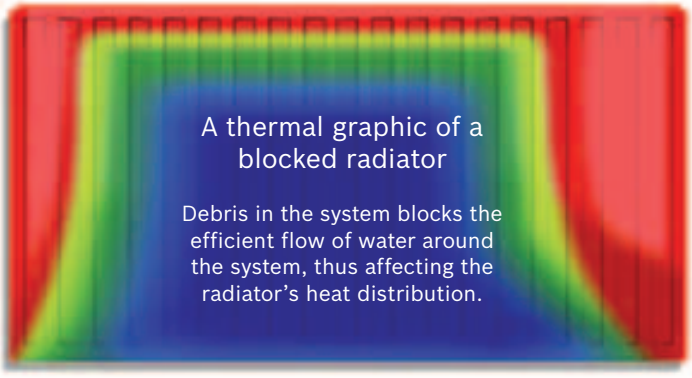
Damaged boiler and system components

- Blockages in primary heat exchanger
- Increased wear on pumps
- Blocked valves.

Heat exchanger damaged by system debris and pollutants

Reduced efficiency

- Energy efficiency loss equivalent to a boiler being reduced from A rated efficiency to D rated, resulting in fuel wastage
- Blocked radiators can reduce efficiency and heating comfort.



A highly effective solution from the brand you can trust

The Worcester Greenstar System Filter has been specifically designed to combat the damaging effects of system debris and pollutants, allowing homeowners to protect their boiler or heat pump for a fraction of its cost. The filter is suitable for 22mm piped heating systems.

At the centre of this innovative design is a highly powerful magnet that removes the magnetic debris (magnetite) that is present in the heating system water. The central location of the magnet ensures that magnetite is collected quickly and retained, maximising the overall protection. Any non-magnetic debris is caught by the twin-action cyclonic trap, a proven technology that offers a capacity to collect up to 200g of magnetite a year.

The Greenstar System Filter has been extensively tested in simulated systems, proving its effectiveness in removing: iron oxide, magnetite, limescale particles, casting sand, welding debris, non-magnetic metal flakes, paint particles and other system pollutants.

The Greenstar System Filter is easy to install and service

Installation

The filter can be installed almost anywhere in a heating system, however to maximise the effectiveness it should be placed before the boiler and after the last radiator.

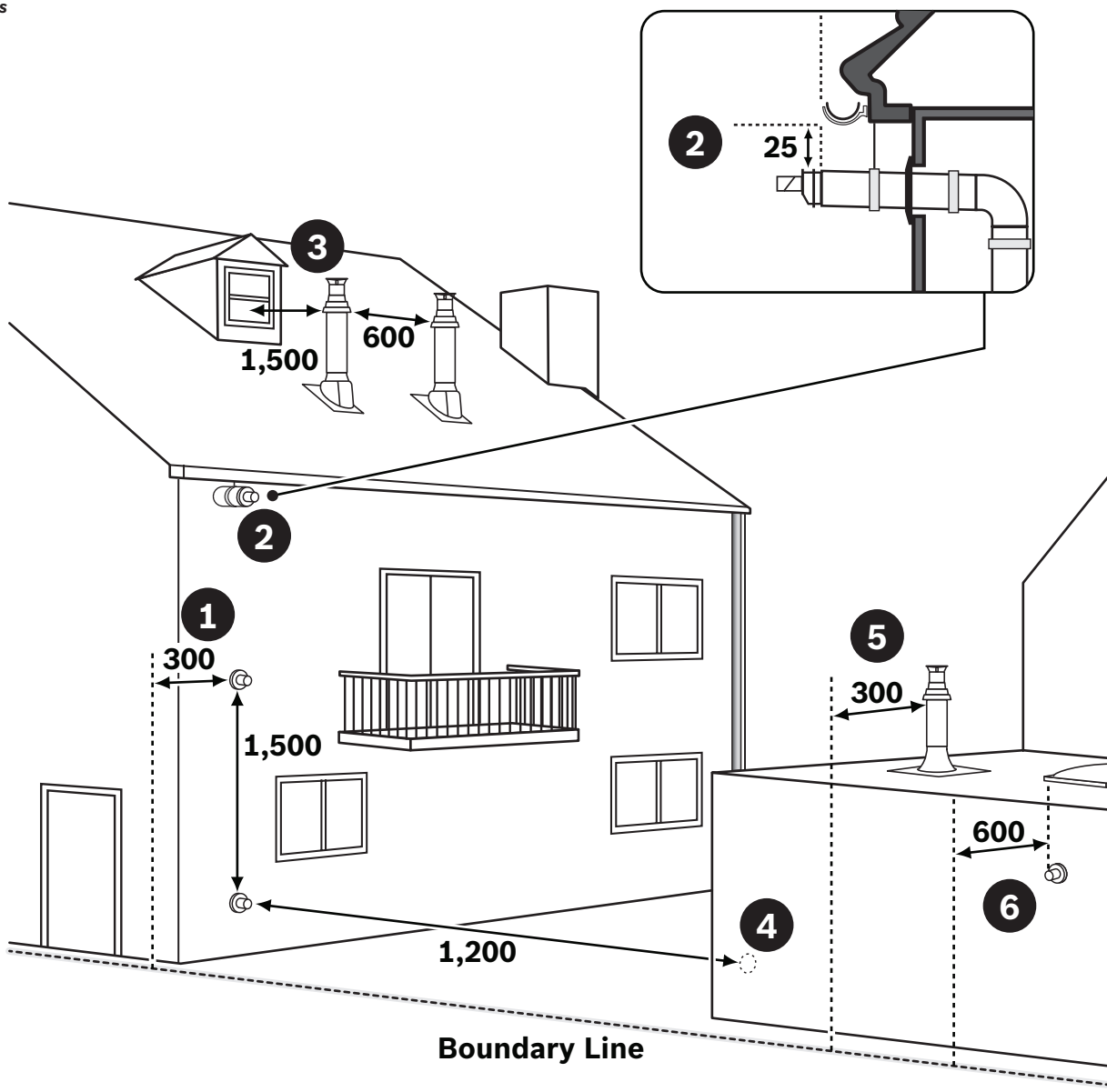
Features	Benefits
Highly effective filter	Safeguards the boiler against damage and protects the efficiency of the system. Saves up to 6% a year on energy bills*
Prevent blockages in radiators	A warmer home and quieter system
High powered internal magnet	Proven technology that can capture up to 200g of magnetite
Cylindrical design	Increased performance – better installation options
Twin-action – magnetic and non-magnetic filtration	Instantly effective against a wide range of system debris
No power consumption or moving parts	No electrical wiring connection or supply needed. Zero running costs and no failure of components
Can be installed under the boiler or away from the appliance	Flexibility
One-way valve for adding system chemicals	Removes the need to isolate a section of the system when carrying out servicing and maintenance
Worcester, Bosch Group specification and design	Reliability of components and filter

**Independent research carried out by GASTEC at CRE*

Product info	
Part number	7 716 192 609

Horizontal and vertical flue terminal positioning

All measurements in millimetres



Note

- **All measurements are the minimum clearances required**
- **Terminals must be positioned so to avoid combustion products entering the building**
- **Support the flue at approximately one metre intervals and at a change of direction, use suitable brackets and fittings.**

Flue bracket part numbers:

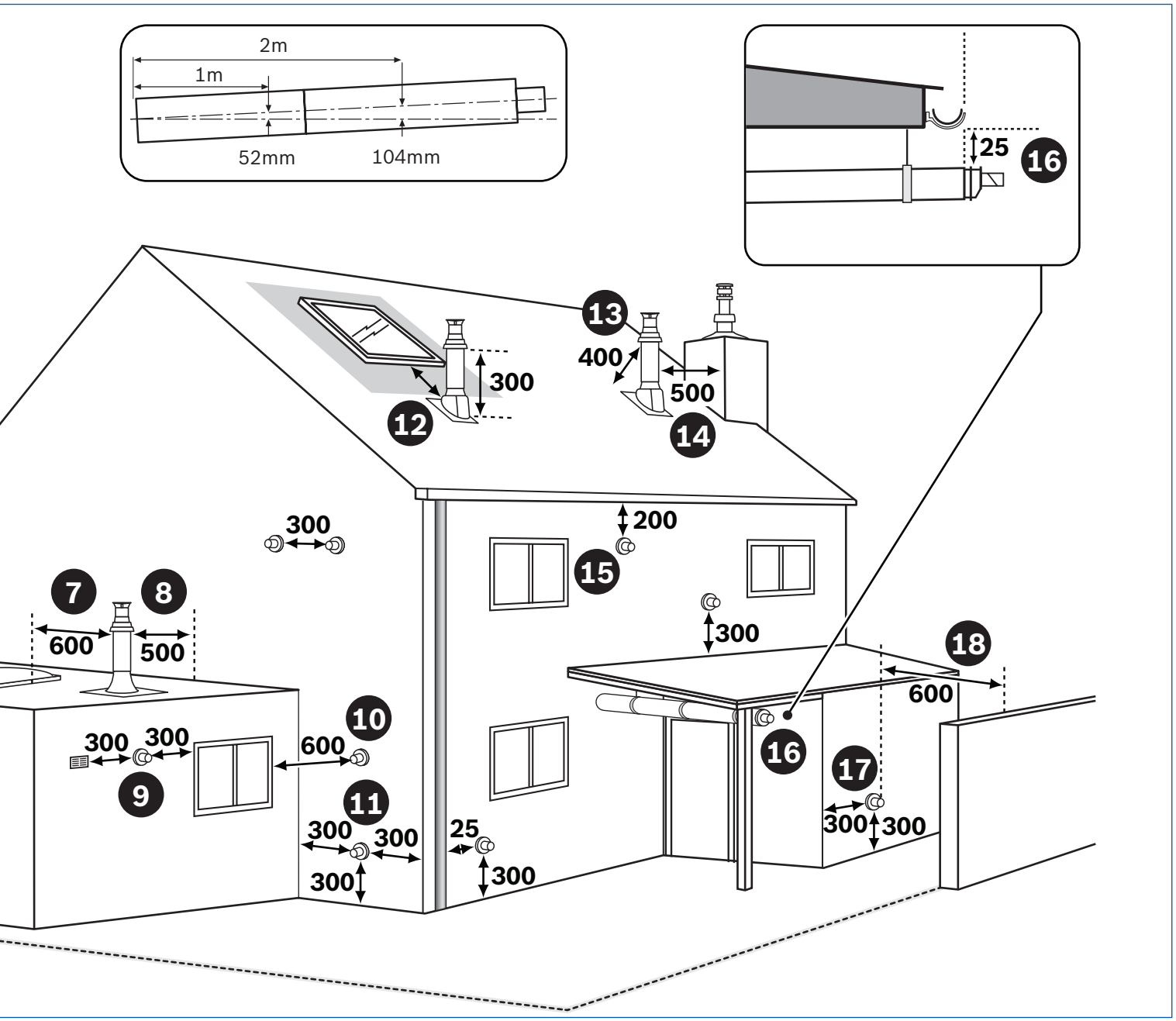
7 716 191 092 (100mm dia.)

7 716 191 173 (100mm dia. x 6)

7 716 191 174 (125mm dia.)

Key to illustration

1. 300mm adjacent to a boundary line.
2. The dimension below eaves, balconies and car ports can be reduced to 25mm, as long as the flue terminal is extended to clear any overhang. External flue joints must be sealed with suitable silicon sealant.
3. 1,500mm between a vertical flue terminal and a window or dormer window.
4. 1,200mm between terminals facing each other.
5. Vertical flue clearance, 300mm adjacent to a boundary line.
6. 600mm distance to a boundary line, unless it will cause a nuisance. BS 5440:Part 1 recommends that care is taken when siting terminal in relation to boundary lines.
7. 600mm minimum clearance from a skylight to a vertical flue.
8. Vertical flue clearance, 500mm to non-combustible building material, and 1,500mm clearance to combustible building material.



9. 300mm above, below and either side of an opening door, air vent or opening window.
10. 600mm diagonally to an opening door, air vent or opening window.
11. 300mm to an internal or external corner.
12. 2,000mm below a Velux window, 600mm above or to either side of the Velux window.
13. 400mm from a pitched roof or 500mm in regions with heavy snowfall.
14. 500mm clearance to any vertical structure on a roof, 600mm to room sealed flue or 1,500 to an open flue.
15. 200mm below eaves and 75mm below gutters, pipe and drains.
16. The dimension below eaves, balconies and car ports can be reduced to 25mm, as long as the flue terminal is extended to clear any overhang. External flue joints must be sealed with suitable silicon sealant.
17. Flue clearance must be at least 300mm from the ground. Terminal guards must be fitted if the flue is less than 2 metres from the ground or if a person could come into contact with the flue terminal.
18. 600mm distance to a surface facing a terminal, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminals in relation to surfaces facing a terminal.

- **Installations in car ports are not recommended**
- **The flue cannot be lower than 1,000mm from the top of a light well due to the build up of combustion products**
- **Dimensions from a flue terminal to a fanned air inlet to be determined by the ventilation equipment manufacturer.**

Greenstar FS CDi Regular boiler series horizontal fluing options

Greenstar FS CDi Regular boilers offer a choice of 2 different sized horizontal RSF flue systems, 100mm diameter and 125mm diameter. The systems have different maximum lengths. Options 1 to 8 detail the permissible lengths.

Horizontal RSF flue

Flue diameter	100mm	125mm
Minimum flue length	130mm	350mm
Maximum flue length	4,000mm	13,000mm

100mm dia. telescopic flue kit

Comprises:

1 x internal flue connector bend
1 x flue adaptor
1 x flue connector
2 x wall cover plates
530mm (100mm dia.) of flue duct including terminal

Part No. 7 716 191 155

125mm dia. standard flue kit

1 x internal flue connector bend
1 x flue adaptor
1 x flue connector
2 x wall cover plates
965mm (125mm dia.) of flue duct including terminal

Part No. 7 716 191 157

Accessories

Components	Part no.	Description
	7 716 191 155	60/100 530mm Horizontal telescopic kit
	7 716 191 083	60/100 1m extension
	7 716 191 084	60/100 90º bend
	7 716 191 085	60/100 45º bend
	7 716 191 133	60/100 Short flue extension
	7 716 191 164	60/100 Vertical flue adaptor
	7 716 191 157	80/125 965mm Horizontal flue kit
	7 719 003 666	80/125 1m extension
	7 719 003 664	80/125 90º bend
	7 719 003 665	80/125 45º bend
	7 716 191 165	80/125 Vertical flue adaptor

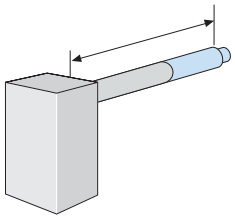
**The 100mm flue system inclines 2º within the 100mm terminal.*

The following criteria should be noted when planning the installation.

- The concentric flue system must be inclined at 3º (52mm per metre) from the appliance, to allow condensate to drain back into the boiler.
- Because the appliance operates at high efficiency a white plume of condensation will be emitted from the terminal. Care must be taken when selecting the flue terminal position (see pages 18-19).

Option 1

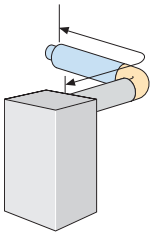
Extension rear flue horizontal flue assembly



Maximum length (m)		Components required	
60/100	4	1	up to 4
80/125	13	1	up to 12

Option 2

Extension rear flue horizontal using a 90º bend



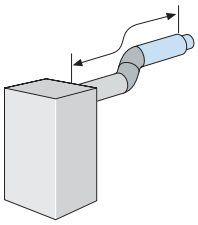
Maximum length (m)		Components required		
60/100	2.5	1	up to 2	1
80/125	11	1	up to 10	1

Deduct 750mm off the total flue length for every 45º bend used.

Deduct 1,500mm off the total flue length for every 90º bend used.

Option 3

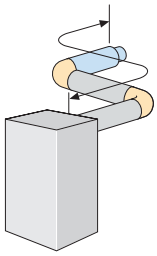
Extension rear flue horizontal using 45º bends



Maximum length (m)		Components required		
60/100	2.5	1	up to 2	2
80/125	11	1	up to 10	2

Option 4

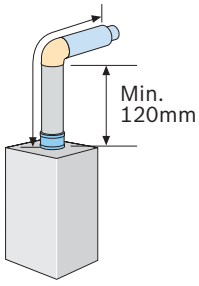
Extension rear flue horizontal using a second 90º bend



Maximum length (m)		Components required		
60/100	1	1	up to 2	2
80/125	9	1	up to 8	2

Option 5

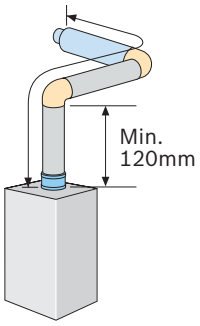
Extension flue upwards and horizontal



Maximum length (m)		Components required			
60/100	2.5	1	up to 2	1	1
80/125	11	1	up to 10	1	1

Option 6

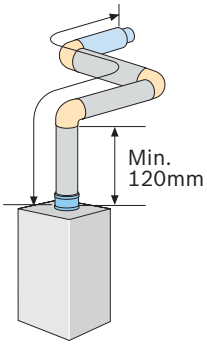
Extension flue upwards and horizontal using a second 90º bend



Maximum length (m)		Components required			
60/100	1	1	up to 2	2	1
80/125	9	1	up to 8	2	1

Option 7

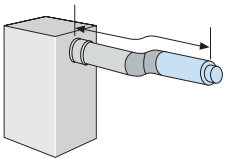
Extension flue upwards and horizontal using a third 90º bend



Maximum length (m)		Components required			
60/100	N/A	N/A	N/A	N/A	N/A
80/125	7	1	up to 6	3	1

Option 8

Side flue extension using two 45º bends



Maximum length (m)		Components required		
60/100	2.5	1	up to 2	2
80/125	11	1	up to 10	2

Greenstar FS CDi Regular boiler series vertical fluing options

Greenstar FS CDi Regular boilers offer a choice of 2 different sized vertical RSF systems, 100mm diameter and 125mm diameter. Both systems have different maximum lengths. Options 1 to 3 detail the permissible lengths.

Vertical RSF flue

Flue diameter	100mm	125mm
Flue terminal assembly diameter	120mm	135mm
Maximum flue length (inc. terminal)	6,400mm	15,000mm
Flue terminal assembly length	1,140mm	1,365mm

Vertical balanced flue kit

Comprises:

1 x flue terminal assembly
1 x weather sealing collar
1 x fire stop spacer
1 x vertical flue adaptor
1 x wall bracket
1 x flue adaptor

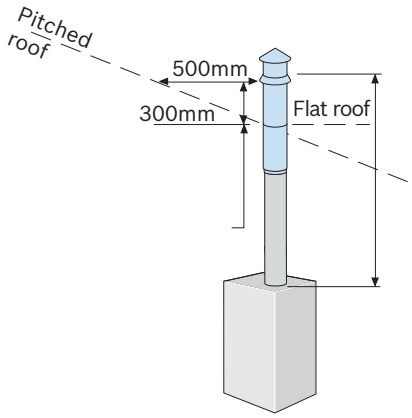
Part No. 7 716 191 156 (100mm dia.)
Part No. 7 716 191 158 (125mm dia.)

Accessories

Components	Part no.	Description
	7 716 191 156	60/100 Vertical 1,140mm kit
	7 716 191 083	60/100 1m extension
	7 716 191 084	60/100 90º bend
	7 716 191 085	60/100 45º bend
	7 716 191 133	60/100 Short flue extension
	7 716 191 158	80/125 Vertical 1,365mm kit
	7 719 003 666	80/125 1m extension
	7 719 003 664	80/125 90º bend
	7 719 003 665	80/125 45º bend

Option 1

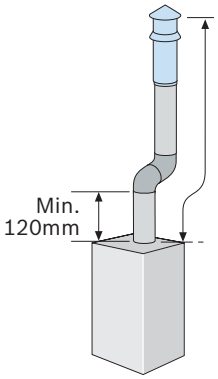
Vertical balanced flue assembly



Maximum length (m)		Components required	
60/100	6.4	1	up to 6
80/125	15	1	up to 14

Option 2

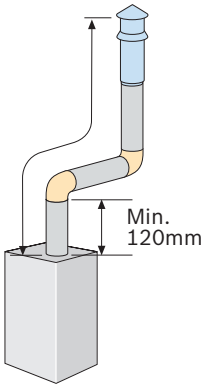
Vertical balanced flue using two 45º bends



Maximum length (m)		Components required		
60/100	4.9	1	up to 5	2
80/125	13	1	up to 12	2

Option 3

Vertical balanced flue using two 90º bends



Maximum length (m)		Components required		
60/100	3.4	1	up to 3	2
80/125	11	1	up to 10	2

Greenstar FS CDi Regular series flexible flue system for chimney installations

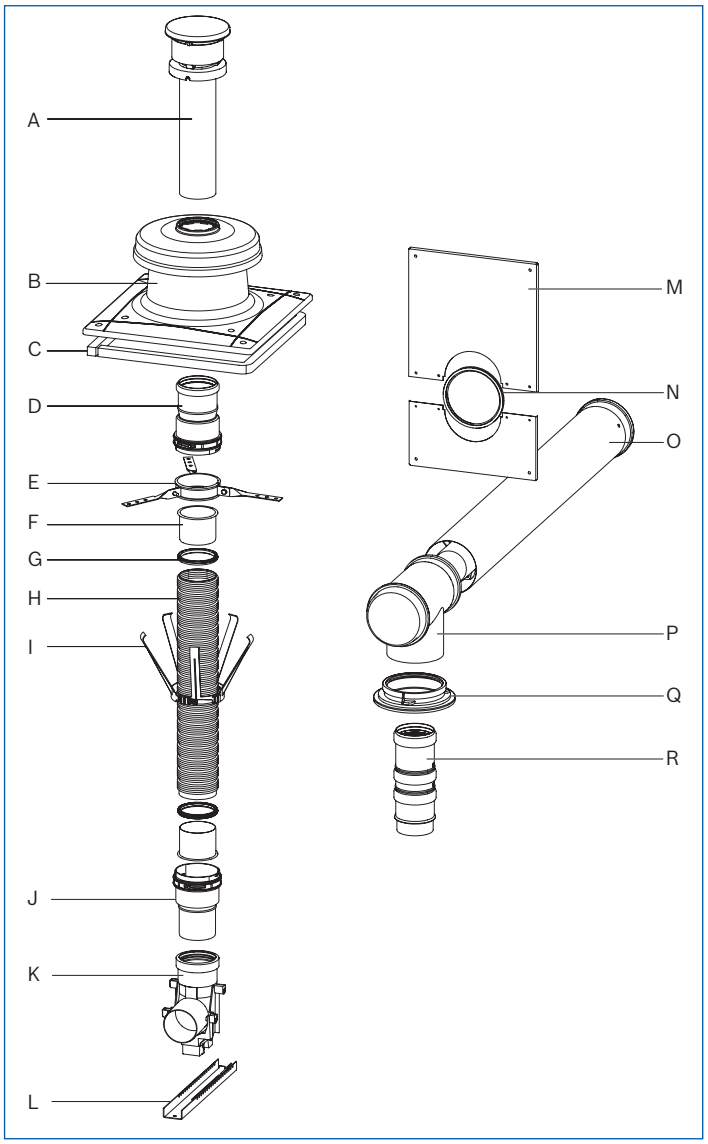
Greenstar FS CDi Regular boilers can be used with a flexible flue system which utilises an existing chimney in the building to route the flue terminating on top of the chimney. It is available in one size – 80mm diameter and 12m length. The flexible liner can be cut down from the 12m length to suit.

80mm flexible flue system

Comprises:

1 x flue terminal (A)
1 x chimney cowl (B)
1 x self-adhesive weather seal (C)
1 x terminal adaptor (D)
1 x support bracket assembly (E)
2 x liner (F)
2 x seal (G)
1 x flexible liner (H)
4 x centralising spacers (I)
1 x support bend adaptor (J)
1 x support bend (K)
1 x bend support (L)
2 x flue inspection plates (M)
1 x seal for flue inspection plates (N)
1 x 125mm flue extension (O)
1 x tee piece (P)
1 x 125mm flue connector (Q)
1 x 80/80mm flue adaptor (R)

Part No. 7 716 191 159



Flexible flue terminal clearances

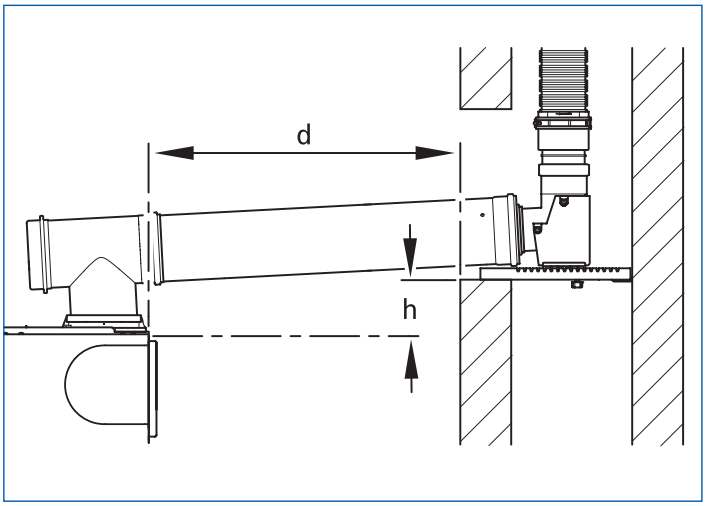
The same clearances apply as for the vertical flue as shown in the flue terminal positioning diagram on pages 18 and 19.

Requirements for the chimney

The flexible flue system is designed to be installed through a hole in the side of the chimney as shown in the diagram opposite.

This will necessitate cutting a hole 150mm min./260m max. width and 360mm min./390mm max height into the chimney.

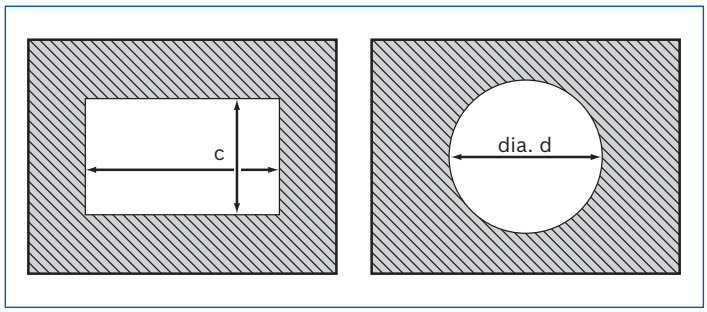
To avoid debris falling into the air inlet duct, do not install the duct with the open end facing up the chimney.



Requirements for the chimney

Chimney size

Ensure the cross section of the chimney complies with the diagram and table below.



Chimney size (mm)			
'c' min	'c' max	'dia. d' min	'dia. d' max
130	300	146	300

Fire resistance

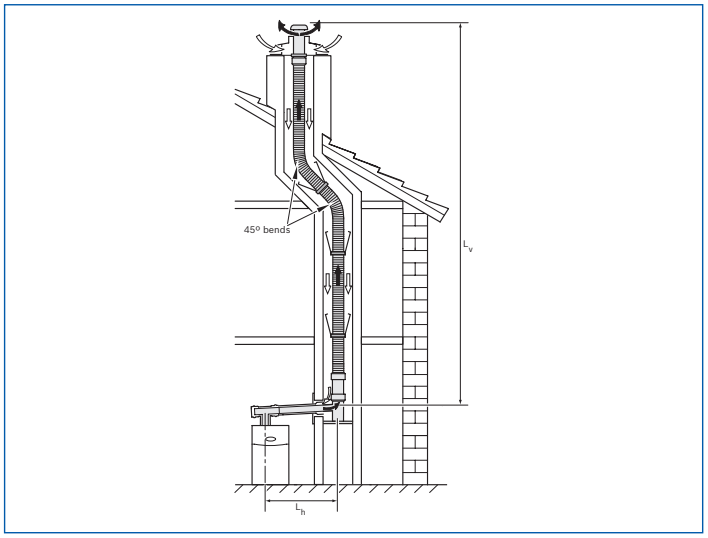
The materials used for the construction of the chimney must be fire resistant in compliance with the figures stated below.

Type of building	Fire resistance
Single storey	30 minutes
Multi-storey	90 minutes

Preparing the chimney

- The chimney must be swept if it has been previously used for an appliance burning a fuel other than gas
- It is recommended that the chimney be swept before installation of the flexible flue
- Any damper or restrictor plate in the chimney must be removed. If it is not possible to remove the sliding damper it must be fixed permanently in the open position
- Any holes in the chimney must be sealed
- The existing chimney pot and flaunching must be removed
- The catchment space (void below the point of flue connection) must be checked to ensure it complies with the flue to be installed
- All debris must be cleared from the catchment space

Calculating the effective flue length



Calculating the effective flue length

Appliance	Max. flue length vertical ($L_v$max)	Max. flue length horizontal ($L_h$max)
FS 30CDi	12m	3m
FS 42CDi	12m	3m

To calculate the effective flue length:

- Check the flue path and consider the following:
  - number of 90° and 45° bends required outside the chimney
  - number of bends in the flexible liner
- Deduct the effective length of each bend from the maximum horizontal flue length of 3m

80/125mm bend	Effective length (m)
90º	2
45º	1

- Deduct the effective lengths of each bend from the maximum vertical flue length ($L_v$max) of 12m.

Bend in 80mm flexible liner	Effective length (m)
45º	1.5

Example of effective flue length calculation

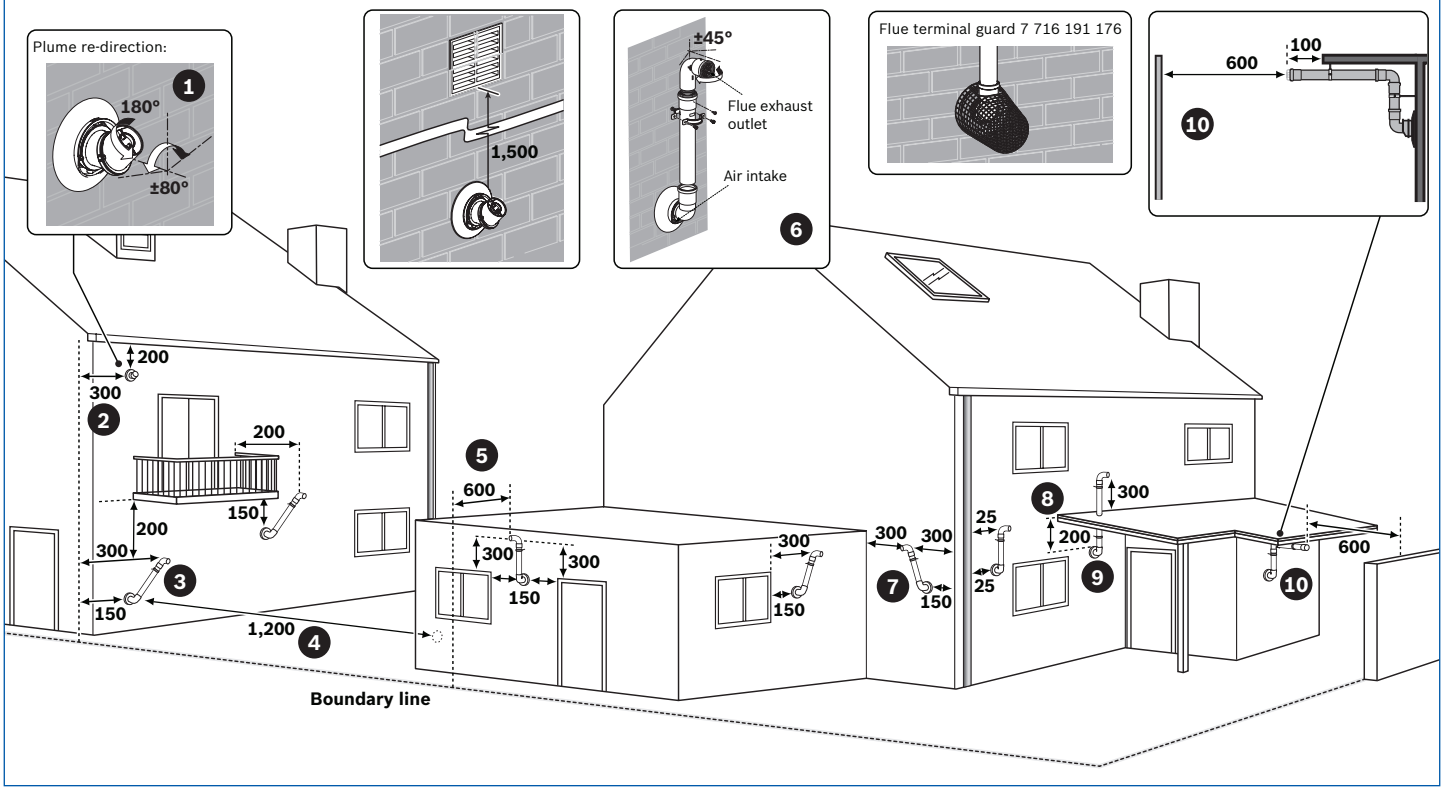
This example shows the use of the flexible flue kit without additional extensions or bends.

Horizontal effective flue length (no extensions or bends)		$L_h \leq L_h$max ?
L_h = 1m	$L_h$max = 3m	Yes

Vertical effective flue length (with 2 x 45º bends)	L_v
$L_v$max = 12m - 2 x 45º bends = 3m = (12 - 3)	9m

Plume management terminal positioning

All measurements in millimetres



Note

- **All measurements are the minimum clearances required**
- **Refer to pages 18-19 for all concentric flue terminal positions unless the flue position is specified on the figure above "Plume terminal positions"**
- **Terminals must be positioned so to avoid combustion products entering the building**
- **Support the flue at approximately one metre intervals and at a change of direction, use suitable brackets and fittings.**

Key to illustration

1. This feature allows some basic plume re-direction options on a standard telescopic horizontal flue terminal. 300mm minimum clearances to a opening e.g. window. However the minimum clearances to an opening in the direction that the plume management is facing, must be increased to 1,500mm. Where the flue is less than 150mm to a drainpipe and plume re-direction is used the deflector should not be directed towards the drainpipe.
2. 300mm adjacent to a boundary line.
3. Plume Management kit air intake can be reduced to 150mm providing the flue exhaust outlet is no less than 300mm adjacent to a boundary line.
4. 1,200mm between terminals facing each other.
5. 600mm distance to a boundary line, unless it will cause a nuisance. BS 5440:Part 1 recommends that care is taken when siting terminal in relation to boundary lines.
6. Using a Plume Management kit the air intake measurement can be reduced to 150mm providing the flue exhaust outlet has a 300mm clearance. Plume kits running horizontally must have a 10° fall back to the boiler for proper disposal of condensate. For details on specific lengths see relevant boiler Technical & Specification information.
7. Internal/external corners. The air intake clearance can be reduced to 150mm providing the flue exhaust outlet has a 300mm clearance.
8. Clearances no less than 200mm from the lowest point of the balcony or overhang.
9. 1,200mm from an opening in a car port on the same wall e.g. door or window leading into the dwelling.
10. 600mm distance to a surface facing a terminal, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminals in relation to surfaces facing a terminal.

- **Installations in car ports are not recommended**
- **The flue cannot be lower than 1,000mm from the top of a light well due to the build up of combustion products**
- **Dimensions from a flue terminal to a fanned air inlet to be determined.**

Plume management system options

Plume management system

60mm dia. plume management kit

Comprises:

1 x terminal bend

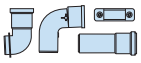
1 x extension 500mm

1 x outlet assembly

1 x clamp pack

Part No. 7 716 191 086

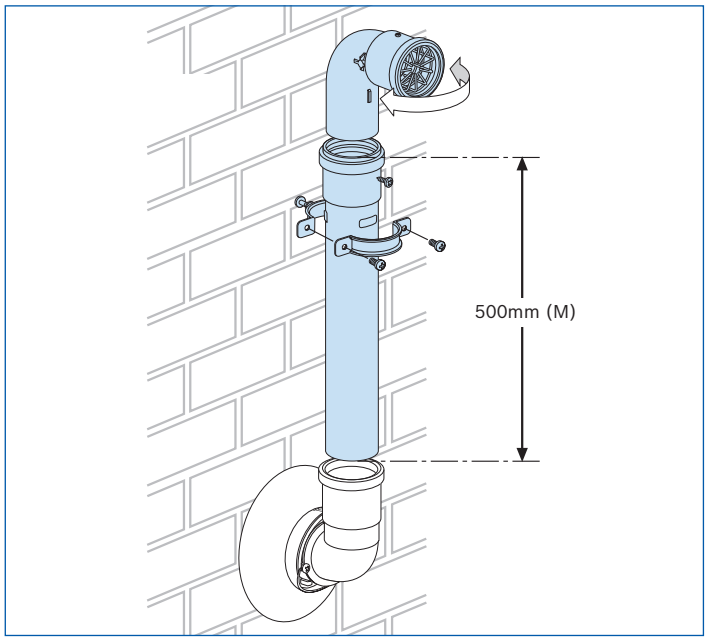
Accessories

Components	Part no.	Description
	7 716 191 086	60mm dia. Plume management kit
	7 716 191 087	60mm dia. Extension (1,000mm)
	7 716 191 088	60mm dia. 90º Bend
	7 716 191 089	60mm dia. 45º Bend (pair)

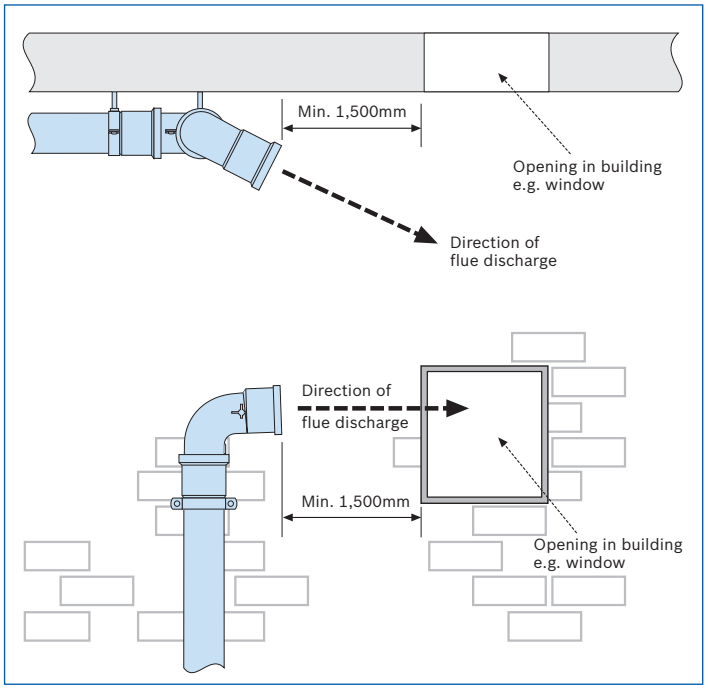
Standard plume management system

The flue terminal outlet has built-in stops to limit rotation for horizontal fluing to allow condensate to run back into the boiler for safe disposal. Do not attempt to force beyond the limit stops.

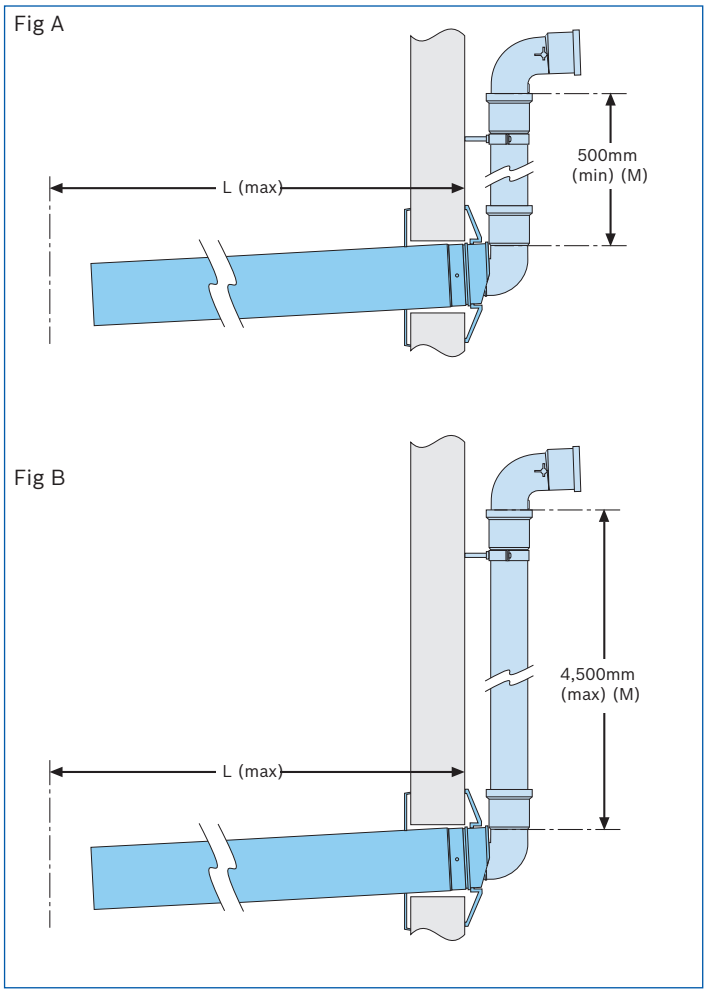
All plume management sections must rise by at least 173mm per metre (10º) from the terminal to ensure that condensate flows back into the boiler.



Re-directing flue discharge from a 60mm dia. plume management outlet



Condensfit II™ telescopic flue and plume management system measuring



Effective straight flue lengths for telescopic flue with plume management		
Model	**Fig. A Max. straight flue length (L) with min. plume management length (M)* (mm)**	**Fig. B Max. straight flue length (L) with max. plume management length (M)* (mm)**
FS 30CDi Regular**	4,000	1,200
FS 42CDi Regular**	4,000	1,200

NOTE:
Plume management minimum straight length = 500mm
Plume management maximum straight length = 4,500mm
****For every additional 1,000mm of plume management length (M), reduce flue length (L) by 700mm – see figures A and B.**

Condensfit II™ telescopic flue and plume management system measuring

100mm dia. horizontal telescopic flue lengths with a 60mm dia. plume management system

The maximum effective straight flue lengths (L) are stated opposite for the relevant appliance together with the minimum and maximum lengths (M) of the plume management system connected, these lengths must not be exceeded.

60mm dia. plume management system

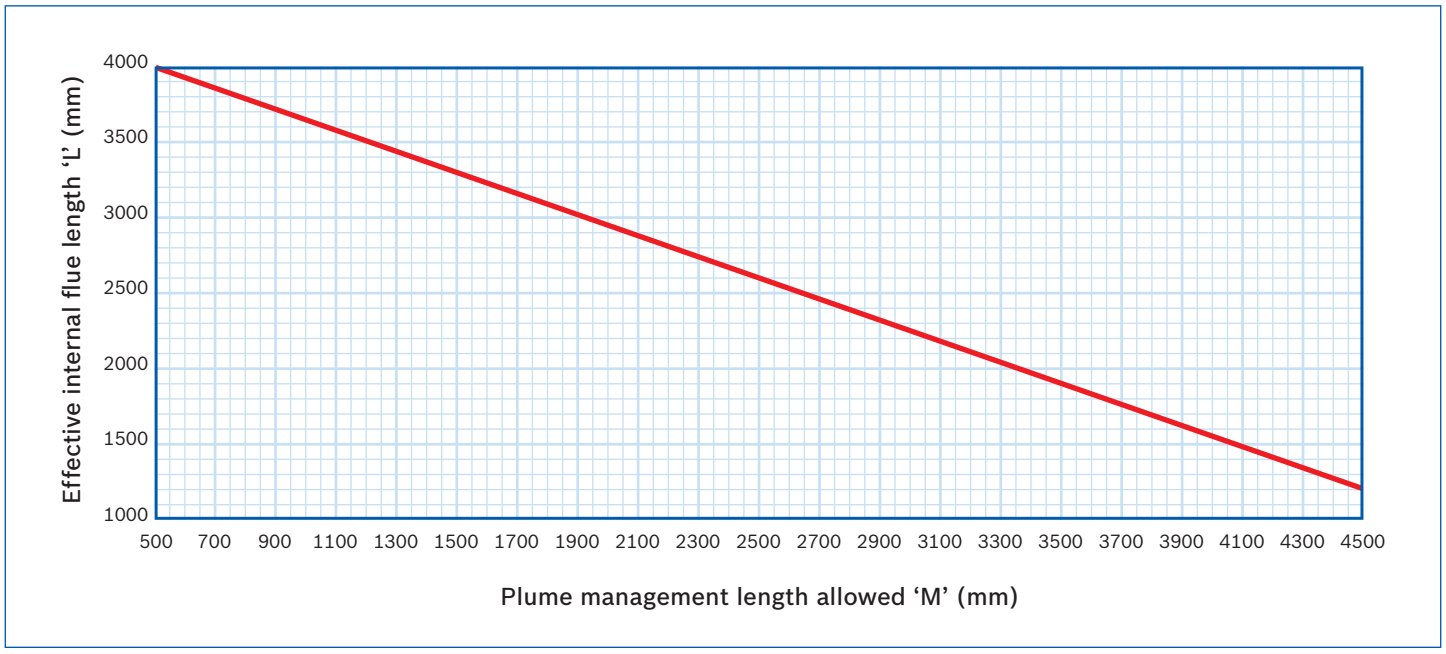
To ensure that the maximum total straight flue length along the plume management route is not exceeded the following should be added to dimension (M):

- 1,500mm for each extra 90º bend
- 750mm for each extra 45º bend

For plume management options with 60mm dia. extensions refer to page 29.

Note: For information on the Condensfit II™ Telescopic Flue System and Plume Management Kit, please see dedicated flue Technical and Specification leaflet 8 716 112 174.

Flue length 'L' versus plume management kit



Use the graph above to determine the permissible plume management length that can be used with your effective flue length 'L'.

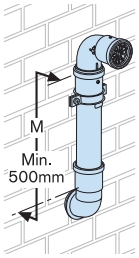
The effective flue length can be determined by adding together all the straight flue lengths and the effective lengths of the bends used, 1,500mm for each 90º bend and 750mm for each 45º bend.

Plume management options

See tables below for details of components required.

Option 1

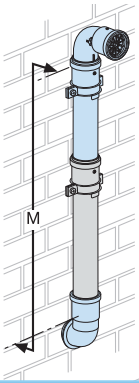
Plume management system



Maximum length (mm)		Components required
Greenstar FS CDi Regular series		
60mm	500*	1

Option 2

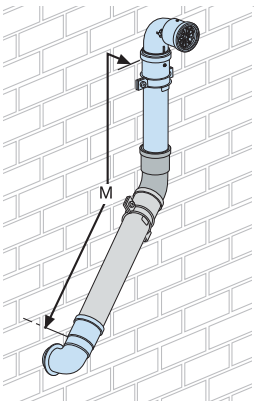
Plume management system with extensions



Maximum length (mm)		Components required	
Greenstar FS CDi Regular series			
60mm	4,500*	1	up to 4

Option 3

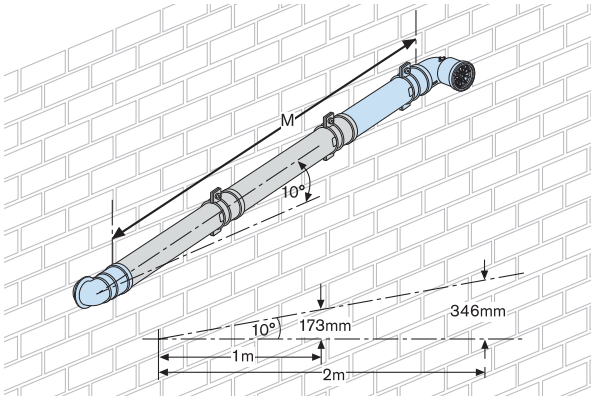
Plume management system with extensions and 45º bend



Maximum length (mm)		Components required		
Greenstar FS CDi Regular series				
60mm	3,750*	1	up to 4	1

Option 4

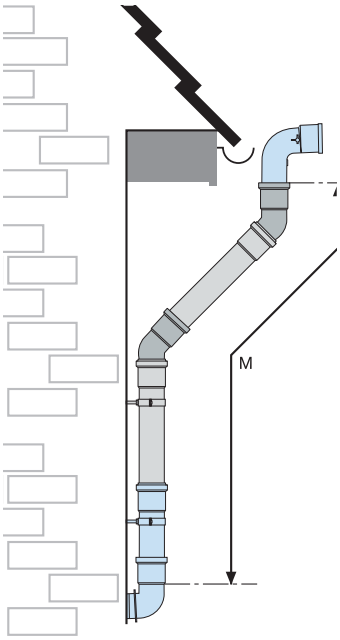
Plume management system with angled termination



Maximum length (mm)		Components required	
Greenstar FS CDi Regular series			
60mm	4,500*	1	up to 4

Option 5

Plume management system with extensions and 45º bends



Maximum length (mm)		Components required		
Greenstar FS CDi Regular series				
60mm	3,000*	1	up to 3	2

***NOTE: You must refer to the table on page 28 to calculate your horizontal flue lengths and plume management length.**

Greenstar FS CDi Regular series accessories

RS telescopic flue kit (100mm dia.)

Worcester Part No.
7 716 191 155

Horizontal flue kit (125mm dia.)

Worcester Part No.
7 716 191 157

Vertical BF kit (100mm dia.)

Worcester Part No.
7 716 191 156

Vertical BF kit (125mm dia.)

Worcester Part No.
7 716 191 158

Vertical flue adaptor (60/100mm)

Worcester Part No.
7 716 191 164

Vertical flue adaptor (80/125mm)

Worcester Part No.
7 716 191 165

1,000mm extension kit (100mm dia.)

Worcester Part No.
7 716 191 083

Short flue extension 220mm (100mm dia.)

Worcester Part No.
7 716 191 133

1,000mm extension (125mm dia.)

Worcester Part No.
7 719 003 666

45º bend (100mm dia.)

Worcester Part No.
7 716 191 085

45º bend (125mm dia.)

Worcester Part No.
7 719 003 665

90º bend (100mm dia.)

Worcester Part No.
7 716 191 084

Note: For information on the Condensfit II™ Telescopic Flue System and Plume Management Kit, please see dedicated flue Technical and Specification leaflet 8 716 112 174.

90º bend (125mm dia.)

Worcester Part No.
7 719 003 664

Support bracket kit (100mm dia.)

Worcester Part No.
7 716 191 092

80mm flexible flue system

Worcester Part No.
7 716 191 159

Plume management kit (60mm dia.)

Worcester Part No.
7 716 191 086

Extension (60mm dia., 1,000mm)

Worcester Part No.
7 716 191 087

90º bend (60mm dia.)

Worcester Part No.
7 716 191 088

45º bend (60mm dia.)

Worcester Part No.
7 716 191 089

Flat roof flashing kit (100mm & 125mm dia.)

Worcester Part No.
7 716 191 090

Pitched roof flashing kit (100mm & 125mm dia.)

Worcester Part No.
7 716 191 091

Greenstar System Filter

Worcester Part No.
7 716 192 609

A Greenstar regular boiler with Greenfloor heating – a great combination

Whether you are upgrading an existing system or installing a new system, Worcester Greenfloor heating can provide an ideal alternative to traditional radiators. Worcester's Greenfloor heating system uses a water-filled pipe system that turns the floor into a large surface area radiator. The pipe system gently warms the space above it through a combination of radiant energy and heat conduction.

In a modern, well-insulated space where heat loss factors have been taken into consideration, underfloor heating can act as the primary heating source and, in most cases, no other space heating methods will be required.

Underfloor heating operates with lower water temperatures than traditional radiator systems. This makes it suitable for use with Worcester condensing boilers, ensuring they remain at their optimum efficiency, with significant energy savings.

As there are no radiators to take up space, Worcester Greenfloor systems also provide maximum flexibility within the property. They can also be used with a wide range of floor coverings, including parquet, carpeting, marble or tiles.

Underfloor heating is a system where every component is important to the overall performance. Worcester Greenfloor systems provide a comprehensive selection of high quality system components, while offering considerable flexibility to meet all project needs.

System components

Greenfloor heating systems comprise a number of elements:

- PE-Xc system pipe
- Stainless steel manifolds
- Manifold cabinets
- Pump and mixing stations
- Pipe fixing methods
- Controls.

Features	Benefits
PE-Xc Pipe, protected against thermal ageing and stress fracture	Flexible and durable
Pre-insulated pipe positioning panels	Quick and easy installation
Stainless steel manifolds	Robust and durable
Full suite of wireless and wired control systems	Suits any type of installation
Uses radiant heat	Less circulation of dust than with radiators, cleaner air for home
Requires lower working temperatures	Maximises the efficiency of condensing boilers and heat pumps
Eliminates the need for radiators	Creates space on walls and allows unrestricted layout within a room
Complements Worcester gas- and oil-fired boilers, ground source and air to water heat pumps	Complete heating and hot water solutions from one source

All Greenfloor systems are supplied complete with all components and connections. Any specialist tools that are necessary are also available from Worcester.

Greenfloor PE-Xc system pipe

System pipe is available in coils, with a reel available to ease unwinding, reduce waste and avoid the need for couplings.

Pipe and pipe fixing method compatibility		
Pipe positioning panel	14 x 2mm	16 x 2mm
Stapler panel systems	14 x 2mm	16 x 2mm
Dry construction system	14 x 2mm	–
Timber suspended floor	14 x 2mm	16 x 2mm

Pipe	14 x 2mm	16 x 2mm
PE-Xc	Yes	Yes
Coil length (standard)	200m	200m
Coil length (long)	750m	650m
Maximum operating pressure	6bar	6bar
Maximum operating temperature	90ºC	90ºC
Minimum bend radius	70mm	80mm

The total **training** experience

Worcester expertise that will build your skills

Worcester has always placed great emphasis on technical support and training for installers and service engineers. Advances in heating technology, including the increasing use of renewables, make the need for training greater than ever.

To ensure the highest levels of competence and expertise in the installation of all Worcester products, we run intensive training courses for installers, commissioning engineers and operatives involved with servicing and fault finding.

Courses available

Our training facilities offer a number of courses suitable for the installer and commissioning engineers, and more in-depth courses for the servicing and fault finding engineers.

Training centres throughout the UK

To enable us to meet the growing demand for training we have invested in additional facilities at the award-winning training academy at our Worcester headquarters. In addition to the original academy there is now a new 400m^2 unit, 25% of which is devoted to an open-plan domestic training area with life-size single-storey brick buildings. These feature working Greenskies solar thermal systems which enable installers to get up onto the roof of the building to get more realistic training. There are bays full of all Greenstar gas-fired appliances, so installers can really get to grips with the importance of system design. The additional space also contains dedicated training areas for our renewable and future products. The training centre also runs certified domestic and commercial ACS training and assessment.

Further academies are located at West Thurrock in Essex, Wakefield and Clay Cross in Derbyshire, all offering our full suite of courses. Please phone 01905 752526 for more information about a course near you. Each course is run by specialist trainers and is superbly equipped to deliver a combination of classroom theory and practical hands-on experience that's second to none.

College-linked Learning

As well as offering training at our own centres, Worcester has established close partnerships with many colleges around the UK, equipping them with our latest products. Call us on 01905 752526 to find out when we will be running the course of your choice at a college in your area.

Mobile training

To complement our training venues across the country, we can also bring training to you.

We have mobile vehicles fully equipped with operational Greenstar gas-fired boilers, dry strip-down models and even a Greensource air to air heat pump, ensuring that quality training in a comfortable environment can be achieved on your doorstep!

If it's oil training you require, our 7.5 tonne mobile oil vehicle is available throughout the country for hands-on product training and OFTEC assessments.

Distance learning/web based learning

Worcester has produced a selection of Distance Learning CD ROMs/DVDs which are packed with information. Call 0844 892 9800 for your copies, or visit **www.worcester-bosch.co.uk** for information on Web Based Learning.

Get on course for a more profitable future now.

Call now for more information 01905 752526

Gas-fired product courses

As a market leader in gas-fired condensing boilers, we aim to ensure the highest levels of competence and expertise in the installation of all Worcester gas-fired products. We run intensive training courses for installers, commissioning engineers and operatives involved with servicing and fault finding.

Our comprehensive gas-fired condensing boiler training courses include product overview, inspection and cleaning of components, CO and CO_2 analysis of flue gas, removal of compact hydraulic, service mode functions and fault finding on 'live and demo' appliances.

Gas-fired condensing boiler courses

Greenstar CDi Classic gas-fired condensing combi boilers.
Greenstar CDi Compact gas-fired condensing combi boilers.
Greenstar Si & i Junior gas-fired condensing combi boilers.
Greenstar system & regular gas-fired condensing boilers (covers Greenstar Ri, Greenstar CDi Classic Regular, Greenstar FS CDi Regular, Greenstar 30CDi Classic System and Greenstar i System boilers).
Greenstar Highflow CDi & FS CDi regular floor standing gas-fired condensing combi and regular boilers.

	CDi Classic	CDi Compact	Si & i Junior	System & Regular	Highflow CDi & FS CDi Regular
Duration	1 Day	1 Day	1 Day	1 Day	1 Day
Cost	£65	£65	£65	£65	£65
Training course covers					
Specification	✔	✔	✔	✔	✔
Installation	✔	✔	✔	✔	✔
Commissioning	✔	✔	✔	✔	✔
Servicing	✔	✔	✔	✔	✔
Maintenance	✔	✔	✔	✔	✔
Course locations					
Worcester	✔	✔	✔	✔	✔
Clay Cross	–	–	–	–	–
Wakefield	✔	✔	✔	✔	✔
West Thurrock	✔	✔	✔	✔	✔
College Links*	✔	✔	✔	✔	–
Mobile*	✔	✔	✔	–	–

*Please contact Worcester Training for specific colleges and mobiles dates

To complement the above courses, Worcester also runs **domestic ACS, unvented, underfloor, water treatment** and **IDHEE domestic heating design courses.**

Additional product and industry training courses

The diversity of products in today's heating industry gives you the opportunity to expand your expertise, whilst offering more choice to your customers. Worcester provides comprehensive training from all its academies on its entire range of technologies.

We are here to provide you with training and assistance for all areas of your business, not just product training. Call us on **01905 752526** to order a full course training brochure or to book yourself onto a training course, alternatively, you can visit **www.worcester-bosch.co.uk/training**

Oil-fired product courses

Greenstar oil-fired products.
Oil advanced fault finding.
OFTEC 101, 105e and 600a.

Renewable product courses

Renewables overview.
Greenskies solar.
Greenskies advanced solar.
Introduction to heat pumps.
Greenstore LECP ground source heat pumps.
Greensource air to air heat pumps.
Greensource air to water heat pumps.
Greensource split air to water heat pumps.
Greenstar Plus hybrid heat pumps.

Accessories training courses

Greenfloor heating.
Worcester controls.

Commercial product courses

Greenspring CWi47 water heater.
GB162 overview.
GB162 domestic.
GB162 commercial.
Greenstar Heat Distribution Unit.
Commercial ACS training and assessment – CODNCO1.

Industry focused courses

BPEC underfloor heating installation.
Hot water systems & safety.
Chemical water treatment.
Construction skills F-Gas training/ assessment certification.
IDHEE domestic heating design.
Domestic ACS training and assessment – reassessment.
CCN1 + 3 appliances.
MCS Made Easy.

A complete after-sales service

As part of the worldwide Bosch Group, Worcester strives to maintain the highest possible standards of after-sales care.

In addition to the no-nonsense parts and labour guarantee applicable to all Worcester products, you and your customers have the assurance that every Worcester product is manufactured to both the appropriate British and European standards.

Worcester Contact Centre

Should you require support, our award winning Contact Centre team, based at our head office in Worcester, are ready to take your calls. Whatever your query our contact centre operators along with our nationwide team of engineers are ready to help you.

Tel: 0844 892 9900

Opening times

Monday – Friday: 7.00am – 8.00pm
Saturday: 8.00am – 5.00pm
Sunday: 9.00am – 12 noon
Bank Holidays: 8.00am – 4.30pm

All the technical advice you need

Spares

Genuine replacement parts for all supported Worcester products are readily available from stock, or on a next day delivery basis. Visit our website at www.worcester-bosch.co.uk/**spares** to find your local stockist.

Customer Technical Support

The Worcester Technical Helpline is a dedicated phone line – committed to providing a comprehensive service to complement the brand name and quality of our products. Our experienced team of technical experts provides answers to queries of a technical nature across the entire Worcester range.

Worcester also has a pre-sales department, which provides assistance in selecting a heating system to suit a particular application, along with full guidance on installation. For more information please contact the Technical Helpline or alternatively visit our website where literature can be downloaded at **www.worcester-bosch.co.uk**.

Technical

Tel: 0844 892 3366
Fax: 01905 752 741
technical.enquiries@uk.bosch.com

Opening times

Monday – Friday: 7.00am – 8.00pm
Saturday: 8.30am – 4.00pm
Bank Holidays: 8.00am – 4.30pm

Notes

Notes

Notes

Useful numbers

Sales
Tel: 01905 752640
Fax: 01905 456445

Spare Parts
Tel: 01905 752576
Fax: 01905 754620

Technical Helpline (Pre & Post Sales)
Tel: 0844 892 3366
Fax: 01905 752741
technical.enquiries@uk.bosch.com

Renewables Technical Helpline
Email: renewable.energy@uk.bosch.com
or telephone 0844 892 4010

Training
Tel: 01905 752526
Fax: 01905 752535

Literature
Email: literature@uk.bosch.com
or download instantly from our website
or telephone 0844 892 9800

Customer Service

Engineer Appointments
Email: appointment.worcester@uk.bosch.com
or telephone 0844 892 3000

Enquiries
Email: service.mailbox@uk.bosch.com
or telephone 0844 892 3000

Guarantee Registration
To register your Worcester guarantee,
please visit our website or
telephone 0844 892 2552

Calls to the listed 0844 numbers are charged at up to 3 pence per minute from BT land lines.
Calls from mobiles and some other networks may vary. Calls to and from Bosch Thermotechnology Ltd
may be recorded for training and quality assurance purposes.

www.worcester-bosch.co.uk

In partnership with energy saving trust™

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